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VERTEBRATES OF WALES AND IRELAND.

By H. E. Forrest.

In 'The Zoologist,' 1903, I published a paper contrasting the avifauna of North-west Wales with that of the opposite counties of Ireland. From the details therein given it was seen that a considerable number of species which are common in Wales are absent or very rare in Ireland. In some few instances the converse of this was noted.

In the present paper I propose to deal in a similar way with the other Vertebrates—Mammals, Reptiles, Amphibians, and Freshwater Fishes.*

To take these groups collectively has this advantage—that it emphasizes the difference in the factors which govern the geographical distribution of Birds and of the other Vertebrates. Whilst the former can pass through the air in any direction, the latter can travel only by land or along rivers.

Geologists tell us that the British Isles were formerly connected with the neighbouring parts of Europe by land. Subsequently subsidence took place, the lowest-lying parts becoming submerged first. The sea between England and the Netherlands is shallow, as also is the sea between England and the Isle of Man, but to the west of this is a deep channel (over fifty fathoms) which is continuous along the whole length of Ireland.

* Marine species are omitted, as they are common to the seas of both countries.

When the subsidence of the land began, this deep channel would be the earliest portion to sink beneath the waves, so that Ireland would become an island whilst Great Britain was still a part of the mainland. A further subsidence submerged more low-lying land, and converted Great Britain also into an island.

The land animals of these islands would naturally be identical with those of Western Europe so long as they were actually united with the mass of the continent, but the species have changed somewhat from time to time. For instance, the Lemming was at one time common over the whole of Western Europe, including the British Isles, but has since vanished from the greater portion of its ancient habitat.

It is evident that any changes in the species of land animals would affect these islands so long as they were connected with the Continent, but not afterwards. As Ireland was separated from the mainland before Great Britain, any species which reached the latter at a later period would be unable to reach the former on account of the sea intervening, whilst the occurrence of a species in Great Britain but not in Ireland would be presumptive evidence that it reached here whilst the latter was still connected by land with the Continent, but after Ireland had become an island. It also follows that species found in both countries are longer established, or "of older family," than those found only in Great Britain.

These considerations add largely to the interest and importance of the facts to be now adduced.*

Fishes.

Pope or Ruff.—Occurs in the Severn and tributaries, the Dee, and canals in the border counties of Wales. Unknown in Ireland.

Roach.—Common in the eastern counties of Wales, rarer in the west. Unknown in Ireland.

Rudd.—Occurs in a few scattered localities in Wales. Abundant in Ireland, where it takes the place of the Roach.

Dace.—Common in the Severn and Dee with their tributaries. Unknown in Ireland.

* Full local details are given in the writer's 'Fauna of North Wales.'

Minnow.—Common throughout Wales. Occurs in Ireland, but is said not to be indigenous; introduced a century ago.

Bleak.—Found in rivers in the border counties of Wales. Unknown in Ireland.

Tench.—Fairly common in the eastern counties of Wales. Occurs in Ireland, but is believed not to be indigenous.

Grayling.—Common in the Dee, Severn, and some tributaries. Unknown in Ireland.

Batrachians.

All the Newts occur both in Wales and Ireland, but the Common Frog is said not to be indigenous in Ireland, although known there for the last two centuries; whilst the Toad is absent from that country.

Reptiles.

St. Patrick is popularly credited with having banished all Reptiles from the Emerald Isle. The only species found there is the Common Lizard. The Adder, Ring Snake, Blindworm, and Sand Lizard are unknown in that country. In Wales all except the last-named are common.

Mammals.

Mole.—Abundant in all parts of Wales. Unknown in Ireland.

Common Shrew.—Abundant in the lowlands of Wales. Unknown in Ireland, where its place is taken by the Lesser Shrew—a rare species in Wales.

Water Shrew.—Not uncommon in the Welsh lowlands. Unknown in Ireland.

Serotine, Barbastelle.—Neither of these Bats occur in North Wales, though found further south. They are unknown in Ireland.

Noctule.—Common in Wales. Recorded in N.E. Ireland, but probably in error; no recent occurrence.

Greater Horseshoe Bat.—Two examples have been recorded in North Wales, and it is common in certain parts of the South of England. Unknown in Ireland.

Polecat.—Formerly common, and still met with in fair numbers in the wilder parts of Wales. Unknown in Ireland.

Weasel.—Common in Wales. Unknown in Ireland.

Stoat.—Common in both countries, though the Irish Stoat is by some zoologists regarded as a distinct species, *Putorius hibernicus*.

Wild Cat.—Extinct in Wales. Unknown in Ireland, though it probably occurred early in the historic period.

Common Hare.—Common in Wales. Unknown in Ireland,* where its place is taken by the Irish Hare—a form of Mountain Hare. This last has also been introduced into Wales.

Dormouse.—Fairly common in the eastern counties of Wales; rarer in the west. Unknown in Ireland.

Harvest Mouse.—Of rare or doubtful occurrence in Wales and the neighbouring counties. Unknown in Ireland.

Field Vole, Bank Vole, Water Vole.—All common in Wales. Unknown in Ireland.

Roe Deer.—Extinct in Wales in the wild state. Unknown in Ireland.

A glance through the above list reveals some striking anomalies. The absence of Snakes from Ireland is so familiar that it passes without comment, but that there should be no species of Vole, no Mole, no Weasel, nor Polecat is indeed remarkable.

In my former paper on the Birds of the two countries I refrained from offering any theory to account for the facts. May not the successive cutting off from the mainland of, first, Ireland and then Great Britain, account for some of the phenomena?

Take, for example, such a comparatively sedentary bird as the Tawny Owl. May it not have established itself in Great Britain whilst still connected with the Continent, but after Ireland had been cut off by the sea? The same argument might apply to the Woodpeckers and other birds that do not habitually cross the sea or perform regular migrations. The idea is not a new one. It has been advanced by several writers, but more particularly by Mr. Charles Dixon in his book on the 'Migration of Birds,' in which he applies it as a principle to account for the routes taken by birds on migration, these following the ancient land-connections between North Africa and South

* Introduced recently into Ireland.

Europe, &c., by inherited instinct. Their ancestors of long ago originally took this route because it was over land connecting the northern and southern countries which they inhabited respectively in the warm and cold seasons of the year, till the following of this route at each returning time of migration became a fixed habit with the whole race.

Applying this to such a species as the Tree-Pipit (common in North Wales, but unknown in Ireland), we might suppose that this bird extended its range to Britain whilst still part of the European mainland, but after Ireland had become an island. When Great Britain became also an island the Tree-Pipit continued to come to its native district from force of habit, but never went on to Ireland, because the instinct to go there had not been implanted in the species by old custom. Of course, all this is theory, but it certainly accounts for much that is puzzling in the geographical distribution of birds in these districts.

I have to thank Capt. G. E. H. Barrett-Hamilton for revising the notes on the Mammals of Ireland.

NOTES ON THE ORNITHOLOGY OF OXFORDSHIRE, 1907.

By O. V. Aplin, F.L.S.

January 9th.—Mistle-Thrush singing.

11th.—A Kestrel at Swalcliffe.

13th.—Song-Thrush singing, the first this year.

15th.—Song-Thrushes have returned in some numbers, and burst into song at once.

19th.—Bullfinches have been numerous this winter, and very destructive to the buds, but there have been fewer about since the December snow.

22nd.—Wind to N.E., and temperature fell rapidly. Early in the afternoon a small flock of Peewits, in boomerang formation, passing over and going at a great pace down wind, showed what weather was coming. The weather from this date was severe until Feb. 9th, and cold until the 15th. A week later there was another short spell of frost. About 8.30 p.m. a Brown Owl was sitting on the point of small flagstaff in front of the house. This point is several inches long, and about the size of an average little finger.

26th.— Song-Thrushes hard up, but have not gone again. Great flocks of Larks.

27th.—Coal-Tit with spring note.

February 6th.—Birds feeding greedily on holly-berries, and Redwings within three feet of my window.

7th.—A lot of Wild Ducks reported flying over Banbury this evening.

9th.—Milder weather. Song-Thrush resumed song.

10th.—Lark sang for first time since autumn.

11th.—Stock-Dove cooing. Song-Thrushes tried to some extent to outstay the frost, and are here now in lessened numbers; one picked up dead. Fieldfares, about the 6th inst.,

having cleared off the holly-berries in gardens, disappeared. Redwings have been very scarce since the December snow. Some Blackbirds left. Some Mistle-Thrushes either left or died.

22nd.—Crows pairing.

27th.—Chaffinches and Blackbirds opened song; a Brimstone Butterfly seen.

28th.—Nuthatch, with rapid trill, at Wickham; we have none here now.

March 6th.—Yellow Bunting singing. Peewits, with breeding notes, on the arable fields. Rooks have some big nests; they usually begin cawing about the nests about the middle of February, or, as an old man said, "about bean-sowing."

10th.—Thermometer 50° in shade for, I believe, the first time since Nov. 29th.

12th.—Apricot blossom.

18th.—Seven or eight Golden Plovers in Cherwell valley opposite Bodicote.

20th.—A daffodil in flower under south wall.

22nd.—Some Fieldfares have returned.

24th.—Wheatear in ploughed field on Milcomb Hill, and a few fresh-looking Meadow-Pipits.

26th.—Three *Turdus* nests building.

27th.—My son Gilbert heard the Chiffchaff at the back of the house, where I heard it next day.

28th.—Examined a Crested Grebe in full plumage, shot at Tusmore on the 25th. It weighed 2½ lbs.

April 4th.—Mistle-Thrush's nest with three eggs.

10th.—Some silent Willow-Wrens.

14th.—The Thrush family and Starlings now feed largely on the abundant crop of ivy-berries, and their droppings, full of seeds (which turn pink), are very remarkable. The berries are so well ripened that they drop off easily, and lie thick under some trees—a circumstance I never noticed before. A good and well-ripened crop of these berries is a most important thing to fruit-eating birds in cold spring weather.

15th.—A Water-Rail picked up near the railway station here, having evidently struck the wires.

16th.—Two Peewits' nests, with four eggs each, substantially built of old stubble, and one of them forming a conspicuous

patch at a distance. They were in fields of young barley, and would probably be destroyed by the roll. Redstart.

21st.—A Swallow about my buildings.

22nd.—Common Sandpiper near Adderbury.

23rd.—Whitethroat and Tree-Pipit. Song-Thrush's nest with *six* eggs in shrubbery.

25th.—Chiffchaffs unusually abundant.

26th.—Cuckoo.

29th.—Ray's Wagtail.

May 2nd.—Have only heard the Cuckoo on two days.

5th.—Two pairs of Swallows arrived about their nesting-places. Up till to-day I had only seen four birds this spring. The next day they were in numbers all about.

6th.—Sedge-Warbler.

[Left England until 24th. I have had news of a Snipe's nest found in South Oxon in April, and several other birds seen in April and May. Also of a pair of Bitterns seen and heard, and another seen a few miles away in the same district in May.]

27th.—A Water-Rail reported as seen at Wickham Mill yesterday.

29th.—Quail calling on east side of the village.

Rain in May nearly $3\frac{1}{2}$ in.

June 1st.—A deluge of rain. At Oxford it is said that ·95 in. fell in twenty-five minutes.

3rd.—Ray's Wagtail is rather more numerous than it has been for some years. Floods.

5th.—Two (? pairs of) Nightingales in the parish this year.

7th.—A second Quail near the village.

8th.—Nightingale's nest in the oak spinney on the Grove estate. Placed under a thorn-bush, on a very bare bank covered with dead oak-leaves; fixed in the forking shoots of a briar. Quite exposed, and yet very difficult to see, as it was made externally of the same oak-leaves. The bird flitted off close to me, but it was a quarter of an hour before I found the nest! Internally the nest was formed of felted decayed leaves, and lined with a little grass and hair. It contained one newly hatched young one, one damaged hard-sat egg, and one addled egg down in the bottom of the lining. This cold wet season will cause

many small hatchings. The male was singing three days before, but to-day I only heard the high clear "whit."

9th.—A Linnet's with five eggs in an ivy-covered arch in the garden—a curious position.

18th.—The Redshanks are reported as breeding at their old place, and others a few miles lower down the river. Others have been seen on Otmoor, and one of them, which I afterwards saw, was shot about the latter end of May.

A very cold and cloudy and rather wet month. In the longest evenings the birds sometimes left off singing twenty-five minutes before their usual time. Red-backed Shrikes have bred or been seen about their three or four usual haunts here.

July 11th.—The weather this month, so far, almost wintry.

15th.—Saw at Oxford a locally taken Reed-Warbler's nest containing three eggs, and a Cuckoo's with a distinct bluish tinge in the ground colour.

17th.—In the flat uplands north of Wroxton saw a female and a male (not one pair) Red-backed Shrike. Many Corn-Buntings about there. Mistle-Thrushes flocked.

19th.—Two Nuthatches at Great Tew. Chiffchaff still sings. A flock of Starlings descended early one morning this summer on a patch of strawberries just ready to gather near the station here, and cleared them all off.

28th.—A Nuthatch in the big oak here. It is now a long time since any were seen here.

About two inches of rain fell on thirteen days this month.

August 6th.—Song-Thrush sang, 4 a.m.

8th.—Young Bullfinches now about the garden. The old birds, I believe, have bred both in front and at the back of the house. Last year there was a nest in a box-bush.

10th.—Among the swarm of Swifts in the air this evening it was easy to detect young birds by their shorter, less curved, and proportionately broader wings.

11th.—Great numbers of Swifts on the wing.

13th.—Many Garden Warblers in garden now. They certainly are eating insects and caterpillars as well as fruit.

17th.—Some diminution in the number of Swifts, but still quite a number here. Coal-Tit with spring note.

19th.—About a score of Swifts. Harvest began here—oats.

25th.—Many House-Martins on the roof nearly every morning since about the 10th. A great deal of Robin song now.

29th.—A few Swifts every evening up till to-day, when I could only see one.

30th.—A brood of young Bullfinches about the garden constantly cry with a husky creaking "peep," quite different to that of the old ones. In the nest-dress the top of the head is brown, face, throat, and neck warm brown.

Rain this month over two inches on seventeen days. A most cold, ungenial summer.

September.—Blackbirds have been most destructive to apricots and plums.

3rd.—A flock of a dozen Corn-Buntings.

10th.—So far as one can see (so little corn cleared yet), a very bad Partridge year—probably the worst since 1879. No Meadow-Pipits in the roots yet.

13th.—Still none. Great congregations of Martins on the roof now. A record crop of plums, the trees breaking down under the weight of the fruit. Blackbirds simply live on them.

18th.—In two small adjoining pieces of clover four Land-Rails flushed and killed; all young birds, but certainly not bred here. Some Meadow-Pipits in the roots for the first time.

20th.—No Martins on roof for several days, and less about.

21st.—I think a great part of our Swallows and Martins have already gone.

23rd.—A flock of about two hundred Peewits on uplands near Barford.

27th.—Chiffchaff singing.

28th.—A good many Martins on roof this morning, probably composed of a second batch of broods.

30th.—I heard at 7 p.m. the unmistakable cry of one or more Oystercatchers passing low down over my garden; dark and cloudy evening.

Fine warm month.

October 3rd.—Large gathering of Martins on roof, and I think no further diminution in numbers yet.

7th.—Great many Swallows and Martins congregating in afternoon.

8th.—Wren sang.

9th.—Report of Woodcock killed in first week of month.

12th.—Harvest late; beans still being cut. A few Swallows and Martins here.

15th.—Six or seven Martins together.

16th.—A very heavy rainfall, causing floods.

19th.—Two Martins.

21st.—A Ring-Ouzel near Tew. Lots of Tortoiseshell Butterflies about.

24th.—Great many Starlings hawking for flies in the warm noon.

25th.—About a score of Fieldfares flew over, going S.W.

27th.—News of a Peregrine killed at Stanton Harcourt, and another adult at Middleton Stoney Park during the past week; both, from their size, appear to have been females. Also of an adult male and a young Hobby, killed about a month or six weeks ago near Sandford, where I have no doubt they bred.

29th.—Song-Thrush sings a little.

Nearly $5\frac{1}{2}$ in. of rain this month; wind chiefly from S.W., and season very mild.

November 3rd.—Some plums still on wall-trees.

13th.—Wood-Pigeons only just fully fledged.

16th.—Song-Thrushes singing fairly well the last week.

21st.—Redwings for first time.

25th.—A good many now.

28th.—Heavy floods.

29th.—When we were having a stubble-field at the top of the hill above Milcomb gorse driven, the beaters sent a Jack-Snipe (which was killed) over the guns. Later, when walking another stubble on a hillside, another got up at our feet. A Wood-Pigeon only just full-feathered.

Rainfall about $1\frac{3}{4}$ in.; wind N. to a great extent.

December 4th.—Heavy floods.

8th.—Report of a young (live) Hobby in Oxford Market, said to have been taken near there.

13th.—Many Fieldfares and Redwings; a good crop of haws. Rooks have built many nests this autumn.

17th.—The floods at Oxford are very large, and it is nearly isolated on three sides.

20th.—Song-Thrushes fairly numerous and in good song.

21st.—Winter aconite in flower.

23rd.—Mr. Calvert writes that a few days ago, when he was waiting for Wood-Pigeons at Potter's Hill, a Merlin came and sat in a tree near him.

27th.—Hardly a Fieldfare to be seen now.

28th.—A bitterly cold day, E.N.E., and weather cold and dry (except a little snow) until end of the year. Temperature nearly the same day and night. Song-Thrushes find a few *Helix aspersa* to hammer.

Rain on sixteen days to amount of 3½ in.; wind chiefly S.W. until nearly the end of the month.

SOME OBSERVATIONS ON BUTTERFLIES AND HORNETS (MADE IN FRANCE).

By Edmund Selous.

July 9th, 1908.—For the last few days I have watched hornets and butterflies feeding on some of the copious exudations of sap from the bark of a small, lopped, stunted oak-tree, of no very healthy appearance. The outflow, after fermenting, to appearance, and bubbling, forms, here and there, a white substance, in much the same way, apparently, as foam is formed along the seashore. It is more substantial than this, but of a very flimsy solidity, if solid at all, properly speaking. It is this that the hornets (as huge ones as I have ever seen) principally come down to feed on, and they are evidently very fond of it. One will not suffer another to feed at the same place with her. Sometimes one, coming, is driven away by one already there, or the latter may be displaced by the new arrival. Two often oppose each other, in the air, flying round and sometimes against each other with a deep, portentous hum, not pleasant to hear. But I have not seen them actually close and use their stings, so may doubt if they would ever go so far. But apparently they cannot eat amicably, side by side, or even a small space apart, as wasps will do. Butterflies—especially now Red Admirals, but also the Great Tortoiseshell and others—also very much affect these exudations, and, strange to say, the hornets are a good deal worried and molested by them, though not in equal degree, by all. They dash at and fly round about them, in a bold buccaneering manner, as they approach or quit the tree, but not when they are quite near it and about to settle, or after they have settled. But time after time, to-day, I have seen them thus attacked, as I may almost call it, when properly on the wing, and almost always by one of the Red Admirals, though once a Great Tortoiseshell did so, but not so effectively. The butterfly dashes right at the hornet, very swifty and impetuously, and then all round about her, with rapid retreats and fresh darts

in—a spirited, dashing performance—but never, I think—that is, as far as I have seen—actually touches the quarry, which, however, is much worried, and, owing to these Red Admirals' much greater powers of flight, quite unable to retaliate. She seeks only to get away, either making for the tree, to which she is not close followed, or getting under full flight for home or elsewhere, when the annoyance soon ceases. It is during the heavy uncertain circling in the neighbourhood of the tree that she is most liable to be thus molested.

What exactly the mental attitude of the butterfly is, when making these sallies, it is not quite easy to say. It looks, however, more like light-hearted gaiety and frolic than real hostile feeling towards a rival or possible enemy, which last, however, it may be; even amongst birds enmity has sometimes the appearance of sport or play. It is curious to see so formidable and formidable-looking an insect as a hornet thus bluffed, as it were, by a butterfly, but the fact is interesting also, in another way, since it shows that butterflies have perfectly good and accurate eyesight, and can distinguish form as well as colour. To dash at a hornet in flight, nearly but not quite touching her, and then to keep dashing about her as she moves, annoying, worrying, almost assaulting, but always just avoiding her, there must needs be perfect definition of the hornet's outline, and quick and sure following of her movements. Further convincing evidence of this fact, which is doubted by Mr. Scudder, has been furnished by Bates,* Belt,† and Mr. Scudder‡ himself, as it appears to me. If these bold butterflies (always I am speaking of the Red Admiral) do not much fear a hornet in the air, neither do they appear to do so when settled on the tree to which they have been attracted, and imbibing its juices. Thus I have observed the following:—

(1) A hornet, thus occupied, was driven away by one of them flying down upon it, then, returning to the charge, over the

* Aerial dances of the Heliconii, wherein no two individuals ever touch ("Contributions to an Insect Fauna of the Amazon Valley," Trans. Linn. Soc. vol. xxiii. p. 495).

† The easy threading, by certain butterflies, of a maze of spiders' webs ('The Naturalist in Nicaragua,' pp. 108–9).

‡ Flying off to fight and returning *to the same twig or stone* ('Frail Children of the Air,' p. 183).

trunk, was, for some time, kept at bay by repeated quick, powerful flaps of the large painted wings; but, at last, continuing to advance, open-jawed, the butterfly decamped.

(2) A hornet about to settle on the spot where a Red Admiral sat in possession was driven away by the latter thus flapping its wings.

(3) Another hornet, or possibly this same one, flying up again, puts this same butterfly to flight.

It is by flapping their wings in this manner that these butterflies drive off flies and bluebottles that come near them whilst they thus feed on the tree's sap, and though a hornet, as might be expected, is able, at last, to impress her personality upon them so as to put them to flight, it seems pretty plain that they do not see in her anything very terrific or dangerous—in other words, her "warning coloration" is apparently lost upon them. But this is not strange, since, unless habitually preyed upon by hornets, butterflies would not have learnt to fear them, and even so, how should any individual learn, except by seeing the fate of his fellows?—for if once seized he would be killed,* and if missed would probably hardly take alarm. Birds, indeed, might learn by individual experience, yet how many—except some few species which may do so habitually—ever attack a wasp or hornet? Is their fear to do so, then, instinctive? But even say that it is, how can such instinctive fear have been acquired except as the inherited offspring of individual experience? and since every new course or habit must demand some corresponding new movement—or change—in the brain, would not this, transmitted, through inheritance, be an acquired character? There appear to be difficulties in the practical application of the warning coloration theory which do not apply to that of protective resemblance, including what is called mimicry. Again, birds appear to avoid bees, the colours of many of which are not of the warning kind, as much as they do wasps, nor is the one class less mimicked than the other. There are many brown bee-like flies.

I had, also, to-day, repeated object-lessons in the pugnacity of these hornets, no two, as remarked, ever feeding in the same place, but the newcomer either driving the first-established one

See, however, p. 337.

out, or being herself driven away by her. One frequent visitant was especially fierce, on one occasion making a most venomous rush after the intruder to some way beyond her preserve, and she then appeared to me to try and sting her, and possibly may have done so. The one thus used crawled for some time on the trunk in a way which seemed compatible with this view, and the day before I had observed another on a heap of potato-plants, on the ground, that for some while was unable to raise herself and fly to the tree. Possibly the sap on which she had been feeding may have had a stupefying effect on her, but I have not seen other evidence of this. This ill-temper and intolerance cannot prevail in the nest, and, as hornets are not so very common, it seems likely that all those visiting this tree belong to the same community. If so, it would seem that the bond of sisterhood ceases beyond the city walls.

July 12th.—Since ~~the~~ last entry I have made a daily visit to this tree, and it is curious that I have not again seen any well-marked case of a hornet being flown at in the way I have described, either by a Red Admiral or other butterfly, though there are as many here as before. As this kept on taking place on that day, over and over again, all the time I was there, within a few yards or even feet of me, and was plain beyond all possibility of mistake or misinterpretation, I do not know how to account for the difference, but with birds, too, I have constantly had the experience of one day being no criterion for others, so that caprice would seem to enter more into animal life than is generally imagined. Had I seen any butterfly suffer for its temerity, this change would have interested me, but I did not, and even, if I had, it could hardly pass for an explanation.

Two butterflies—both, I think, Red Admirals—were displaced, by hornets, from their feast to-day, and certainly with much less ado, but this may have been mere accident.

July 14th.—The hornets that I have hitherto been observing are of great size (though no doubt *Crabro vulgaris*), considerably over an inch in length—to judge without measuring—and bulky in proportion; but to-day a much smaller kind, hardly half their weight I should think, yet identical, as far as I can see, in every other respect, have made their appearance. Yet even these look more than twice the bulk of an ordinary wasp—they are con-

siderably larger than a queen wasp. There was a good deal of antagonism between this smaller sort and the larger ones, and it seemed, at first, as if the new-comers were the bolder and more pugnacious of the two. They frequently flew at the other kind, and, being nimbler on the wing, teased and annoyed them a good deal—to the extent, indeed, that sometimes these large hornets were chased by the smaller ones, whom they seemed to fear, or, at least, to be glad to avoid. This, however, was in the air only. On the tree they gradually established themselves as predominant, being able to expel undersized intruders on any coveted spot, whilst remaining there themselves, though often bothered by them. I believe these small hornets are more formidable to butterflies than the great ones. Several times they have darted angrily at them, when on, or hovering about, the place they wanted to come to, and once out of the corner of my eye I saw one fly from the tree, in a slanting line, to the ground, evidently borne down in some way which I could not distinguish. Almost immediately afterwards, however, as I turned and saw clearly, a Red Admiral butterfly struggled out of the grass, and the hornet rose, a second or two afterwards, from about the same place. I imagine that the hornet had seized the butterfly, and come down with it in this way, when the butterfly had managed to disengage itself and fly off uninjured—for I could detect no sign of injury. Otherwise the hornet, falling for some other reason which I cannot suggest, must, by coincidence, have pitched on, or almost on, a butterfly, in a not very usual place for one of the kind—in the midst of some tangled grass, that is to say. Yet it seems strange that, if this hornet had really a butterfly in its grasp, I should not have detected this, but only that (as I thought) it was hampered in some manner, and constrained to fall. But I was watching something else, and it was only, as I say, the merest glance out of the corner of my eye. As it was early in the day, and these small hornets were quick, brisk, and entirely sober in their movements, as was this particular one also after flying back to the tree, I am sure that partial intoxication, produced by the sap it had drunk, had nothing to do with the incident.

July 19th.—Yesterday, or the day before, I visited the tree again in a high wind, as also to-day, which is windy, too. Possibly for this reason I saw no large hornet there on either occa-

sion, but only the much smaller kind. If the high wind has nothing to do with their absence, then I can think of no other cause for it except that the smaller hornets have driven the large ones away.

I have noted, now, what I before had a hint of, namely, that these small hornets are amicable with one another. Several times two have fed together, and, on each occasion, I thought I saw them touch antennæ, like ants, but whether they did this or not, there was an unmistakable little movement—a sort of start or thrill—of mutual recognition and tolerance, such as I have never seen between the larger hornets, who uniformly drove one another away. It is true that one of the various pairs who thus, several times, fed together, never stayed more than a very short time (perhaps because the other had the best place), but there could be no doubt whatever as to the friendliness of their feelings, of which their close proximity alone—once almost, if not quite, touching—was a sufficient evidence. This is what one might expect with inmates of the same nest, but can all these large hornets be from different nests? It is too late in the year, I suppose, for them to be queens—as from their size one might almost imagine—and, even were it not, who would dream of seeing some six or eight hornet queens together? If then, as seems most probable, they represent but one nest in the neighbourhood, there is a marked difference, as between the two species, in the strength of the social tie which binds together the members of the same community.

I saw several examples, this afternoon, of boldness in butterflies (Red Admirals and Large Tortoiseshells) with these smaller hornets. They advanced right up to them, on the tree, flapping their wings, with the idea, it seemed evident, of driving them away, and though they always, in the end, flew off themselves, yet evidently they had no precedent fear of these formidable insects. The theory of warning coloration certainly receives no illustration in their case. It also struck me that the Great Tortoiseshell butterfly, by closing—that is to say, putting up—its wings, so that only their dark under surfaces were visible, ceased to be noticed by the hornets, though there was little or no sign of its doing so, instinctively, in relation to such an end, when in proximity to any one of them. But the habit is a

frequent one, and the disappearance, by it, of the butterfly in question, when sitting on this tree-trunk, almost as complete, sometimes, as in the case of the Leaf Butterflies of India and the Farther East.

These smaller hornets were still on the tree to-night, after dark, at about nine, but neither then, nor during the daytime, did I see any of the large ones.

July 20th.—To-day, during a space of time in which formerly some half-dozen would have visited and kept flying about and feeding at it, one only of the larger species of hornet came to the tree, and, flying down on a particular spot where they had all been accustomed to feed, alighted, incidentally, right on one of the smaller kind, who was busy there. As a result of this, the large one incontinently flew right off and away, and did not return; nor did any others of her kind make their appearance whilst I was there. Now, in a similar *rencontre*, during the first day or two after the arrival of these smaller hornets on the scene, the latter would have flown to some other place on the tree, and the larger kind have established themselves in their room, or, if not at once, would probably have returned and done so, or even if ousted (but this was not the course of things) would have remained to feed elsewhere. This frank retreat, without even any preliminary circlings about the tree, but straight away, is unprecedented, in my experience hitherto, except once under quite different and artificial conditions, and that was when I rubbed with a Japanese *menthal*, which I had, a certain spot on the tree, to which one of these large hornets (there being then no other kind) was in the habit of coming. The instant after alighting she flew off in a straight line, without stop or stay, exactly as did this other. From the above incident, and their absenting themselves shortly (though how shortly I cannot say) after the arrival of these smaller hornets, it would seem as though the latter were in some way obnoxious to *Crabro vulgaris*. That these are pestered by them I have myself seen, though I should not have thought it was to the point of their leaving such dwarfs in possession.

July 21st.—A Great Tortoiseshell came and drank for some moments at the same place with a hornet, before the latter drove it away, with a hostile demonstration. The hornet was

there first. Thus, again, it is evident that there is no initial instinctive fear of hornets on the part of these butterflies. That they give way, after a certain point, is what might be expected of an insect that is not a fighting one at all, and unprovided with any kind of weapon whatever. But they seem to have no more special fear of a hornet than of a fly or beetle, often letting it come right down upon them, as they feed, before flying away. The hornets often come down upon one another, also, in this way.*

I have seen fresh evidence, this afternoon, of the good fellowship of these lesser hornets, when two (I have not seen more) meet together at the same place, though, as before remarked, they never feed long thus, one soon shifting its quarters. But there is, each time, a distinct act, or emotion, of recognition, following on contact, or close proximity, after which their conduct is quite amicable; and even before, whilst they only expect one another, there is no very threatening deportment. In all this they differ from the larger kind, whose behaviour, in this connection, was always as before described. Yet it seems most unlikely that all of the six or eight, perhaps, of the latter were from different nests—the small ones, some four, or perhaps half a dozen, no doubt belong to the same.

That the numbers in each case are not very much greater appears to me to be strong evidence (without any experiments) that these hornets are not capable of communicating the intelligence of this tree, which they find so attractive, to one another, or even of inducing a comrade to accompany them thither. The nest is evidently too far away for many to be led to the feast by observing and following the flight of others, and thus, out of the whole community, only a few units have by accident come upon it; yet these are more, probably, than would be the case were the tree at a great distance. But if news could be brought to the nest, or the mere signal "Follow me" be given, there would be a continuous stream backwards and forwards. It is difficult, therefore, to imagine an experiment more decisive, for that the

* As such a mistake always seemed to worry the maker of it, it may perhaps be taken as evidence of bad sight on the part of hornets. Yet surely they should see each other in bright sunlight even though quiescent. Impetuosity might partly explain it.

sap exuded by this, probably, diseased tree is peculiarly attractive there can be no doubt. There were, for instance, at one time, this afternoon, six of the Large Tortoiseshell butterflies settled on its trunk, at the same time, either feeding or looking for a place—a beautiful sight to see, for the wings of several, if not all, would often be spread to the sun at the same time. Various flies, too, are always about it, and I once saw a Rose Beetle apparently feeding, for a hornet of the large kind, coming to the same place several times in succession, walked over him, each time, without appearing to notice he was there—the beetle keeping perfectly still. When the evening falls a number of moths—small for the most part—take the place of the butterflies.

I have only seen one other tree—also a small lopped oak—from which there was a similar but much less extensive exudation, and here, too, there were two or three Red Admirals gathered.

Some days after this I noticed that the flow of sap from this tree was much diminished. In consequence, the smaller hornets were not coming so frequently, but, a little later, the flow had again increased, and was much the same as before. They were then correspondingly busy, but I did not again see any individual of the larger kind. The failure of the sap is felt by the hornets much sooner than by the butterflies, no doubt because the slender proboscis of the latter is enabled to deal with it in quantities, and in situations insufficient or impracticable for the latter.

NOTES ON THE HAIRY ARMADILLO (*DASYPUS VILLOSUS*).

By Lionel E. Adams, B.A.

Rambling lately in the wild country up the River Parana, I made the acquaintance of this interesting creature in the following manner.

On the cactus-covered plain I frequently came upon congregations of mounds of sand about the size of large moles' fortresses, and evidently formed in a similar manner, *viz.* by ejection from subterranean workings. The entrances to the burrows from which the material had been ejected were at the bases of the mounds, and were almost invariably blocked up, quite unlike the large open-mouthed burrows of the Vizcacha with which I was acquainted. I failed to find any footprints on the hard ground, but often found excreta resembling that of rabbits but larger. I made inquiries of the country people, and was told that the animal which made the mounds was called "Touc-Touc." I was, of course, no wiser than before, nor was I more enlightened when a comparatively educated man told me that the "Touc-Touc" was the same as the "Peludo." This word I found in my Spanish dictionary to mean "an oval hairy mat," not a bad descriptive name for the species in question, though at the time I did not recognize it as such. Some of the Guachos called it the "Quirquincho," a term borrowed from the Indians of the Chaco.

However, one day, while walking among some fresh heaps, I heard a mysterious sound—"Touc-a-touc, Touc-a-touc, Touc-a-touc, Touc, Touc, Touc"—very difficult to locate. Listening carefully I approached the direction of the sound, when suddenly it ceased. I sat down on a heap to watch and listen, and presently the sound began again about ten yards away in a different direction. As I listened I perceived that it came from underground, and I recognized the appropriateness of the

mimetic name "Touc-touc." I was still, however, unable to identify the animal. Presently I saw the earth at the base of a mound become disturbed and sprays of earth fly upwards upon the mound, resembling the showers of earth ejected by a terrier in a rabbit-hole. The sprays ceased after about half a minute, and a small head was popped up and instantly withdrawn, leaving me still unable to identify the owner. The fact was that I was expecting some furry animal "like a rat," as the Guachos had described the animal to me. I asked one of these men to get a spade and dig one of the animals out for me, but he explained that the tunnels ramify in all directions for thirty or forty yards, and that the animals can burrow faster than the spade can follow. However, he offered to catch one for me that night, and next morning brought me a specimen of the Hairy Armadillo.

I learnt later that they are easily caught by men who watch for them near their burrows at night when they come forth to feed; in the daytime they rarely show themselves. The name Armadillo is not known in the "camp," as the wild country is called, and few people know the term even in Buenos Aires, where it is called "Meluta."

I brought my captive on board and installed him in a barrel half filled with sand; every day throughout the homeward passage I took him for a run about the deck and gave him his dinner. As to food nothing came amiss—any boiled vegetables; ship biscuit, which he easily crunched with his horny jaws; tinned meat; toast; rice-pudding; but what he liked best was raw meat, which he would come and take from my hand if he was near enough to smell it. His power of sight seemed very poor, and he always seemed to notice the proximity of food by scent. He grew fairly tame, and when I used to visit him in his barrel to take him out for his daily run he would scramble towards me with a great display of excitement.

The natives say, and I think rightly, that the sound "Touc-a-touc" is made by stamping or digging in the burrows. The only vocal sound I ever heard my captive utter was a snuffling whine of delight when I gave him slugs and snails (*Limax maximus* and *Helix aspersa*) in my garden in England. The preference for snails is odd, because there are no land mollusca on the arid

plain where the Armadilloes live. The natives say they come at night to feed on remnants of slaughtered cattle, but their natural food is said to be grubs which they dig up with their powerful claws. I had no opportunity of testing my captive with a snake, but I can imagine that snakes are often killed and eaten, as Hudson describes in his 'Naturalist on the Amazon.' My attention was drawn to the probability of this as one day I drew a piece of rope across him, when he turned and seized it with a sudden quickness I should not have thought possible.

In the Argentine the Armadillo is considered a great delicacy, and is said to resemble delicate pork in flavour; about ten shillings is the usual price.

Fancy baskets are made of the carapace in Buenos Aires. I have seen these baskets in England where they are often supposed to be the shells of crabs!

ROUGH NOTES IN EAST SUSSEX IN 1908.

By Hugh Whistler.

Amongst the woods and hills of East Sussex, within sight of the South Downs that form Beachy Head, is situate one of those happy hunting-grounds that warm a naturalist's heart—an old English deer-park. The scene of these random notes (Ashburnham Park) is a particularly fine example of its kind—a thousand acres of miniature hill and valley. A deer-park for centuries, it is well stocked with timber—grand old oaks and beeches, with a good sprinkling of elms, a few groups of firs and some fine stone-pines. In the midst, surrounded by bracken, is set a picturesque old grey house, wherein resides the deer-keeper for the time being. It was my good fortune to receive the noble owner's kind permission to wander at will over his property—a permission of which I was not slow to take advantage.

April 13*th*.—A fine sunny day tempted me to commence operations, and I rode my bicycle over to one of the lodges, known locally as "Tower Lodge" from its shape. In answer to my inquiry about Owls, the woman there told me that several were to be heard calling at nights in a big ridge of firs just outside the park. A man had been at work woodcutting there one day, and after a time had happened to look up and see two Brown Owls in a tree above his head, which must have been sitting there for hours undisturbed by the noise he was making. She also said that once she had been taken to see a nest of young Owls in some rocks in the park. Setting off along the coach-road I came to a stone bridge built over a stream, which runs between steep banks, in such a way as to dam it and form a small pond. This pond has a fringe of coarse rushes—an abode beloved of Waterhens; on one side the ground forms a steep and very high bank, leaving a path around the water. Here amongst the drifts of dry leaves a Snake and some Lizards were sunning themselves; the Lizards darted under the leaves,

while the Snake took to the rushes. As I followed the path round, a Wild Duck suddenly rose at my feet from a heap of the leaves, disclosing a well-concealed nest; the down and leaves were heaped so thickly that the eggs were scarcely visible. Thence to the "rocks" on the side of a slope; they were evidently still haunted by some bird of prey, as there were plenty of pellets and whitewash, while one ledge in particular seemed to be often used. A few Starlings nest in holes in the sandstone.

The groves of trees were alive with Green Woodpeckers and Nuthatches, and resounded with the laugh of the former and the "pretty dick, pretty dick, dick" of the latter. At one time three pairs of the Woodpeckers were in view near one another, all engaged in violent flirtations. In an old oak by the road there was a small hole, about three feet from the ground, which a Nuthatch had plastered up and filled with fragments of dry leaves, but as yet there were no eggs.

Later on I saw an oak in which was a big hollow rotted out above the lowest branches; on going nearer I perceived that the ground beneath was littered with large castings, two or three inches in length. This looked so promising that it seemed worthy of closer investigation, but how was I to get up? The tree, which was too big to swarm, stood on the edge of a bank, and its lowest boughs were several feet above my reach. Luckily several dead branches were to be seen lying about, and one of these I fetched and dropped at the foot of the tree. The crash brought out a beautiful Barn Owl, who flew into a neighbouring oak, whence, after turning his white face to have a look at me, he sailed away. This incident increased my enthusiasm, which was still further heightened, while I was collecting more branches, by the appearance of a second Owl from the hole. At last the pile was completed, and mounting on it I succeeded, with the aid of a twig about the thickness of a lead pencil, in getting my arms round a bough, when suddenly the erection collapsed, leaving me hanging in mid-air. Pulling myself up I found the bases of the boughs littered with more pellets which had overflowed from the hollow. The hole was thickly carpeted with broken pellets which gave forth an unpleasant odour, and on the sodden trampled mass reposed one white egg—a sight which

well rewarded my hard work. On several occasions I came again to visit this curious *ménage*. It was amusing to stand in front of the tree and make a noise which would bring a dimly-seen white head to peer from the hole, followed by the grand swoop of the bird as it left the tree.

Amongst the other interests of the park is a rookery; this, which consists of about seventy nests, is in two portions. There are a few nests in large trees in a hollow, while the most are in a fir plantation on the edge of a higher level some slight distance away. Climbing up to one nest I found it contained one egg and three naked youngsters, one of whom was noticeably larger than his brethren; from there I could pull another nest close enough to see that it contained one egg. As I left, one of the numerous Rooks that were in the air hovered high above the tree, and then, seeing its treasures safe, gave vent to a couple of "caws," exultingly as it seemed, before flying away again.

April 14*th*.—To the park again. A Stock-Dove flew out of a hole in an oak-tree, so I climbed up; inside was a slight nest of sticks and coarse grass-stems containing one egg. These birds are common there and nest in the numerous holes, but as a rule they are very hard to get at. One nest I found was at the end of a very tall rotten birch-trunk—quite unapproachable. Strangely enough Jackdaws are not as common as might be expected; I only remember seeing one—carrying a stick in its beak, though plenty are to be seen with the Rooks outside the park.

April 17*th*.—Spent the greater part of the day in the park. By sitting down and watching a pair of Nuthatches through my glasses I found they were preparing a small hole in one of the upper boughs of a fair-sized oak. I went up to inspect, and saw the wet mud pitted with little holes made by the point of the bird's bill. *Apropos* of Nuthatches, a pair brought off a brood this year in the circuit-wall of Battle Abbey above the pavement by the main road, yet scarcely any of the passers-by were aware of the fact.

About half a mile from Tower Lodge a Kestrel came out of an oak which had been broken off at some little height from the ground. At the top was an open hollow, strewn with castings, but as yet it contained no eggs. Close to the nest a Squirrel

came out from behind a gaping piece of bark, where it had a "seat" just like that of a Rabbit, made of moss and twigs. In another part of the park a second pair of Kestrels evidently had a nest—perhaps in a large elm whose top had also been broken by some storm. Both birds kept flying round, and once when they were near the tree I heard a typical nesting cry. An attempt to wait and discover their nest with certainty was frustrated by one of the pair who would insist on sitting in neighbouring trees and watching me, giving vent to screams at intervals.

Several pairs of Lapwings nest on the stretches of coarse grass around the deer-keeper's lodge, and one of the nests I found by coming up a steep slope and putting the bird off its nest about ten yards from the top. A short search revealed the hollow with two eggs.

April 23*rd*.—Visited the rookery again and examined several nests, finding incomplete and full clutches and young birds. One egg in the Kestrel's nest, a rather poor reddish brown specimen.

I was unable to visit the district again until June 4th, when I walked over but did not actually enter the park. Just outside the paling I met one of the keepers near his cottage, hard by Tower Lodge. In answer to my inquiry whether he knew of any nests, he asked what kinds I wanted to see. "Oh, Hawks, Owls, Nightjars, Kingfishers—anything interesting." He then said that he had just come from a wood where he had been "lying up" waiting to shoot a male Sparrowhawk by its nest. There were some big nests in a clump of larch-trees, and there two days before he had killed a female that had suddenly darted past, apparently off one of these nests. In order to kill both birds he should have shot the male first and then the female; as it was, he had almost given up trying for the cock, and had thought of putting a charge of shot into the nest that morning, but had finally decided to make one more attempt for the bird itself. He was just going home for dinner, but after, if I liked, would show me where the nest was. Accordingly we set off later, and after a long tramp reached the larches, where he pointed out the nest, which he considered occupied; it certainly looked promising; a big platform of larch and other twigs against the

trunk about half-way up a larch. So up I went, and with some trouble reached the nest, while the keeper contentedly sat and smoked below. Putting in my hand I felt eggs; then climbing higher, I could feast my eyes on five beautiful eggs, which I took. They were hard-set, and took about half-an-hour apiece to clean—it could not be called "blowing"—in spite of the man's assurances that they would be fresh, as the Sparrowhawk never laid less than six or seven. Later on he found another nest on the same beat containing young.

We afterwards visited a wood bordering the high road, where the keeper told me there were Long-eared Owls, which he said had already safely brought off a brood. I flushed one in a fir-tree from a ragged old heap of fir-needles that might have once been a nest. Our attention was attracted by the screams of a Blackbird to another which was sitting up in a tree; he, disgusted by our admiration, flew away as well. The man also told me of a Kingfisher's nest from which, I believe, a brood was successfully reared. The Deer in the park consist of Red and Fallow Deer.

NOTES AND QUERIES.

AVES.

Nesting of the Lesser Redpoll (Linota rufescens) in Sussex.—Last year I reported the undoubted nesting of the Lesser Redpoll in the parish of Maresfield (Zool. 1907, p. 352), and am pleased to say that a pair again nested at the same spot this year. I first saw Redpolls there on May 19th, when there were either four or five apparently engaged in courtship. On the 21st there was one pair, the female collecting materials for building, which consisted of fine dead twigs of birch and willow-down, and on the 26th I discovered the nest in a small birch tree. On the 30th the female was sitting, but I did not examine the contents of this nest, thinking that any damage done to the tree would be likely to lead to its detection. I regret to say that the nest was robbed of the young birds somewhere between June 18th and 25th. However, as the birds remained in the vicinity, it seemed most probable to me that they would make another attempt to bring off a brood, and though I quite failed to find the nest, yet the female was there with the young birds on Aug. 4th. There need be very little doubt that others have bred in the immediate district, and on July 25th I met with a cock bird at a spot in the parish of Framfield, where the Lesser Redpoll has only been seen by me during the winter months hitherto.—Robert Morris (Uckfield, Sussex).

Early Flocks of Starlings.—Referring to the note on this subject (*ante*, p. 312), I do not consider June 21st an early date for young Starlings to be seen in flocks. In this part of the country the Starling is the first bird to gather into small flocks. Directly the young broods leave the nests they follow the old ones into the fields, and they prefer small grass fields surrounded by tall hedgerows. Here they meet with other broods, with which they join company, and as day after day other broods emerge the flocks grow to some size. It is now a good many years since I first noted down these facts. In 1884 young birds flew on May 18th, and I saw a flock of sixty or seventy birds on June 9th. In the previous year the young broods were following the old ones on May 23rd. In 1890 I saw a small flock of twenty or twenty-five as early as May 24th. With us the Peewit is the next

earliest bird to gather into flocks. In 1885 I saw twenty-two in a flock on June 6th, and in 1904 a small flock two days later. Then comes the Mistle-Thrush, which may be seen in small flocks (and never forms large ones—here, at least) in the first half of July. In 1883 I counted twenty-nine in a flock on July 8th, and in the following year, on July 14th, I saw thirty-nine together. — O. V. APLIN (Bloxham, Oxon).

Sandwich Tern on Breydon, Yarmouth.—While taking a trip on Breydon water with Mr. A. H. Patterson, the well-known Norfolk naturalist, on Sept. 3rd, we had the pleasure of seeing, on No. 16 stake, a Sandwich Tern (*Sterna cantiaca*). It allowed us to approach within about three or four yards of its resting-place; it then flew off in the rather leisurely manner which is apparently one of its characteristics. — FRANK A. ARNOLD (139, Hamilton Road, West Norwood, S.E.).

Prolific Breeding of the Dabchick (Podicipes fluviatilis) and late nesting of the Great Crested Grebe (P. cristatus).—On July 27th last I visited a pond in the neighbourhood of Oxted, to which several pairs of Dabchicks resort annually for breeding purposes. With the aid of my field-glass I detected a Little Grebe with two young, sitting upon a nest situated about thirty-five yards from the nearest bank, the parent bird leaving as I approached more closely, and being followed by her chicks, which experienced considerable difficulty, being but recently hatched, in forcing their way through the thick coating of "duckweed" which covered the surface of the pool. On glancing into the nest I was somewhat surprised at making the discovery that it contained a single egg, which from its unstained appearance was evidently freshly laid. A friend visited the locality on July 28th, and reported that a second egg had been deposited, and on the day following I accompanied him to the pond, but found that the number of eggs had not been increased since his last visit. Unfortunately a day or two later our observations were brought to a sudden termination by the nest being destroyed. There can be little doubt that this species frequently rears two, if not three, broods in a season, but the very rapid means of propagation recorded above must be somewhat exceptional. The normal laying period of the Great Crested Grebe appears to extend from April to June; it may therefore be of interest to record that on Aug. 2nd last I paid a hurried visit to one of the Surrey breeding haunts of this beautiful species, and was fortunate in discovering a nest containing four partially covered eggs, which I judged to be about half incubated. I should mention that at

the particular nesting-place to which I refer the Crested Grebes are protected, and this exceptionally late laying is not likely to have been occasioned by the repeated depredations of egg-collectors, although it is possible that earlier broods may have been entirely destroyed by Pike, of which there must be a large number in the lake.—C. H. Bentham (Oxted, Surrey).

Sabine's Gull.—On Sept. 1st a specimen of Sabine's Gull (*Xema sabinii*) was shot on Breydon. There have been previously only about three or four records for this locality.—Frank A. Arnold (139, Hamilton Road, West Norwood, S.E.).

Bird Notes from Yarmouth.—During the trip mentioned in my note *re* the Sandwich Tern, some other birds seen were a flock of about forty Knots (*Tringa canutus*), some Common Terns (*Sterna fluviatilis*), Ringed Plover (*Ægialitis hiaticola*), Godwits, Common Heron (*Ardea cinerea*), and several species of Gulls. There is very little to be seen in the bird line just now, the birds at the present time being harassed on all sides by gunners. Around us from almost every quarter comes the report of guns, sending destruction to any feathered creature that ventures within gunshot. I understand that from March 1st to Sept. 1st shooting is prohibited on Breydon. What a pity this protection is not extended over the entire year! Breydon would then become an ideal sanctuary for its feathered visitors. Perhaps this will be done in the future—*when too late.*—Frank A. Arnold (139, Hamilton Road, West Norwood, S.E.).

Ringed Birds.—The winter quarters and routes of our migrant birds are as yet unknown, and there is only one method which leads to positive knowledge on this account: the marking of birds by aluminium rings, a method which has been tried with success in Germany and in Denmark, as a House-Stork marked in Pomerania was caught in Africa, 15° S. of the Equator. The Hungarian Central Bureau for Ornithology has now also begun the marking of young Storks, Herons, Gulls, and Swallows. The aluminium ring is fastened around the leg of the bird, and it bears in each case the inscription "Budapest," followed by a number which corresponds to the entry in the Register-book of the Hungarian Central Bureau for Ornithology. Anyone catching such a marked bird, or hearing of the capture of such, is kindly requested to send the ring to the Hungarian Central Bureau for Ornithology, József-körút 65, Budapest VIII., Hungary, accompanied by a notice stating the locality, time, and particulars of

capture.—Otto Herman (Director of the Hungarian Central Bureau for Ornithology, Budapest).

PISCES.

Double Flounder.—On Sept. 1st a small boy, who had been fishing by the Yare-side for Flounders, brought me a very interesting specimen, 5½ in. in length, both sides of which were of a sooty-black hue. The head was notched a short way behind the upper lip, as is somewhat common to "double" flat-fishes, and in this nick or notch the "right" eye remained fixed in such a position that a view on either side (did the fish swim in the vertical manner ascribed to freaks of this sort) was easily obtained by the fortunate (?) possessor.—Arthur H. Patterson (Great Yarmouth).

INSECTA.

The Jumping Bean.—Amongst the many wonders to be seen at the Franco-British Exhibition may be mentioned the so-called Jumping Beans, which have been imported from Mexico. These beans are apparently continually jumping up and down day and night. If one of these be cut open the reason is apparent. It is due to a small grub which lives within. As there is no hole in the bean through which the animal has bored its way, it is evident that the perfect insect must have laid its eggs in the flower, which, on ripening into the fruit, enclosed the grub. The most satisfactory reason so far offered to explain the meaning of this peculiarity is that the grubs instinctively feel that if they remain near the tree they will be attacked by some enemy. Now, it appears to me far more reasonable to suppose that it is a case of "symbiosis"—that is to say, that the plant and animal live together, so as to be of use to one another. Each bean as sold in the Exhibition is really only a third part of a bean, the other two parts each carrying a seed; and these two parts, I understand, are eaten by the natives, whilst the third is sold as the jumping bean. One advantage that the plant gets is that its flowers are fertilized by the perfect insect when passing from flower to flower to lay its eggs. It has been found that the grubs live longer if kept in a light and warm place. It appears to me, then, that this is a second advantage to the plant, inasmuch as the grub, in endeavouring to get into a warm and light place, naturally jumps away from the shadow of the tree into the light and warmth of the sun; thus the two seeds, borne away in this manner, obtain fresh soil and sunlight to commence their growth. They will be carried still further by

water, if the trees, as I believe, live in a morass. The advantage the grub gets is very obscure. That there is an advantage is clear from the fact that if a hole be made in the bean the grub, instead of trying to escape from its prison, does just the opposite, closing the window with a web. I should think that as the parent tree must be covered with these grubs, they want a fresh dwelling place, and they secure this by travelling with the seeds. As soon as the seed commences to grow the grub has a fresh tree to start on. But the life-history of these insects is essential before a reliable account can be obtained. As I have only seen the beans for a few hours, perhaps someone who may have kept and studied them will bring forward a more satisfactory explanation to account for this peculiar phenomenon.—J. P. Lloyd (St. Giles's Vicarage, Norwich).

[The creature inhabiting the bean is the larva of one of the *Tortricidæ* (Lepidoptera). According to Dr. Sharp: "There are, at least, two species of these insects, and two plants harbouring them, known in the United States and Mexico, viz. *Carpocapsa saltitans* living in the seeds of *Croton colliguaja*, and *Grapholitha sebastianiæ* living in the seeds of *Sebastiania bicapsularis*."—Ed.]

EDITORIAL GLEANINGS.

British Association at Dublin, 1908.—The meeting just terminated at Dublin was under the Presidency of Dr. Francis Darwin, whose Address, though largely dependent on botanical observations, was a reaffirmation of his distinguished father's position in the famous theory of Natural Selection, as distinct from much of the neo-Darwinism of the present day, and as opposed to many of the conclusions of Weismann.

The Zoological Section was presided over by Dr. Sidney F. Harmer, who devoted the larger part of his Address to the problems attached to a philosophical study of the Polyzoa, especially those relating to an explanation of the functions of the avicularia. For a proper estimation of this important zoological contribution the Address requires to be studied throughout, but the following extracts are a guide to the conclusions of its writer:—

"The decision of the principles on which the Polyzoa should be classified may not be a matter of immediate practical importance, but our theories of species cannot be regarded as established until they have shown themselves capable of explaining all the cases. Some modification of the Mendelian theory seems to me to be capable of elucidating the apparently haphazard way in which the several forms of avicularia are distributed in the species of Cheilostomata, and it

may perhaps be allowed to afford a working hypothesis that can be used in systematic study. The results of such a hypothesis would, I think, be far-reaching. Whether we are justified in accepting it provisionally or not, I am convinced that we require some hypothesis by which we may regard two specimens as belonging to the same species, even though they may differ in what might at first sight seem to be fundamental respects. And, *vice versa*, we require the liberty to regard two species as widely separated from each other in the system, even though they possess identical types of avicularia. There are other questions which might have been considered in the Cheilostomata, and, in particular, the presence or absence of oral or marginal spines and the forms and distribution of the ovicells. The occurrence of the latter is, however, probably connected with the presence in the young zoœcium of tissue which will give rise to an ovary, and this implies the consideration of another factor which is very difficult to estimate.

"I must not conclude without at any rate referring to the fact that the Polyzoa are by no means the only animals in which dimorphism or polymorphism occurs as the result of blastogenic processes. But among the Cœlenterates, for instance, the occurrence of medusoid individuals cannot be considered apart from the question of sexual cells. There is, however, one series of cases among Hydroids to which allusion may perhaps be made. I refer to the existence of pairs of genera such as *Corymorpha* and *Tubularia*, *Syncoryne* and *Coryne*, *Podocoryne* and *Hydractinia*, in each of which pairs the two genera are distinguished by the fact that one produces free medusæ, while the other has sessile gonophores. There is already some evidence that the validity of these generic distinctions is open to question; and the free medusoid individual and the sessile gonophore might conceivably be related in such a way as to form members of an allelomorphic pair. The same phylum contains another striking example of dimorphism in the distinction between gastrozooids and dactylozooids in many Hydroids; while in the Siphonophora the differentiation of various forms of individual has advanced much further. But I have already gone much beyond my evidence, and I must bring my remarks to a conclusion by expressing the view that the causes which regulate the differentiation of the individuals during the blastogenic development of the Polyzoa are well worthy of further study, and that our knowledge of the unity of the vital processes throughout the animal kingdom gives us reason to believe that they are part of some general biological law."

A most timely protest was made by Mr. G. A. Boulenger "On the Abuses resulting from the strict Application of the Rule of Priority in Zoological Nomenclature and on the Means of Protecting well-established Names." Disapproval was expressed of the extreme application of the rule of priority, which in the author's opinion had brought about much mischief under pretence of aiming at ultimate uniformity. The author protested against the abuse to which this otherwise excellent rule had been put by some recent workers, encouraged as they were by the decision of several committees who had undertaken to revise the Stricklandian Code, elaborated under

the auspices of the British Association in 1842. The worst feature of this abuse is not so much the bestowal of unknown names on well-known creatures as the transfer of names from one to another, as we have seen in the case of *Astacus*, *Torpedo*, *Holothuria*, *Simia*, *Cynocephalus*, and many others which must be present to the mind of every systematist. The names that were used uniformly by Cuvier, Johannes Müller, Owen, Agassiz, Darwin, Huxley, Gegenbaur, would no longer convey any meaning, very often they would be misunderstood; in fact, the very object for which Latin or Latinized names were introduced would be defeated. It is all very well to talk of uniformity in the future, but surely we must have some consideration for the past. Names with which all general zoologists, anatomists, and physiologists are familiar should be respected, should be excepted from the rule in virtue of what may be termed the privilege of prescription. If biologists would agree to make that one exception to the law of priority in nomenclature, things would adjust themselves well enough, and we might hope to see realized some day what we all desire, fixity in names, that we may readily understand the meaning of all writers, not only over the whole civilized world, at the present day and in the future, but back into the past century which has marked so great an advance in zoological science. Such a result would be attained by protecting time-honoured names of well-known animals from the attacks of the revisers of nomenclature. For this purpose future committees that may be convened to discuss these topics might confer a real and lasting benefit on zoology by determining, group by group, which names are entitled to respect, not, of course, on the ground of their earliest date or their correct application in the past, but as having been universally used in a definite sense. This suggestion is not a new one. As far back as 1896, in a discussion which took place at the Zoological Society of London, Sir Ray Lankester, protesting against the digging up of old names, suggested that an international committee should be formed, not to draw up a code of rules but "to produce an authoritative list of names—once and for all—about which no lawyer-like haggling should hereafter be permitted." Twelve years have elapsed, and nothing of the kind has been arranged. On the contrary, the various committees that have legislated since have insisted on absolute priority, and we often read that such a decision has been arrived at by international agreement. It is not so; a great body of zoologists in this country protest and hope that something will be done towards carrying out the proposal here briefly set forth, which seems to be the only proper step to take in order to prevent the confusion with which we are menaced.

"An Inquiry into the Feeding Habits of British Birds" was the subject of a paper by Mr. C. Gordon Hewitt. It is becoming increasingly difficult, with the introduction of scientific methods into agriculture, horticulture, and forestry, for zoologists studying economic problems to form a definite opinion with regard to the economic status of many species of the birds of our islands, such as, for example, the Rook, Jay, Starling, Chaffinch and other finches, and many other birds. This difficulty is entirely due to the almost complete absence in this country of any precise information as to the food habits of our

birds. There exists a large amount of evidence obtained from observers, such as fruit-growers, gamekeepers, sportsmen, and others; and, although some of this may be and is useful, much of it has been distorted on its way through the prejudiced glasses of the observer. What is really necessary in order to obtain as accurate a conception as possible of the economic status of any species of bird is the actual dissection and recording of the contents of the crops and stomachs of a large number of individuals killed, not only in different months of the year but also in different localities, since different conditions exist in different regions, for example, in Kent and Lancashire. Such evidence is the only real and safe guide, and observational evidence, after careful selection, must only be taken as supplementary. Very little work of this nature has been accomplished in this country, but until it is done the regulations with regard to the protection of birds will be ever subject to the influence of the personal bias and ignorance of the legislators, and such legislation will be on as equally a sound foundation as many of the fisheries regulations were until the advent of scientific fishery investigations. The Biological Survey Bureau of the United States Department of Agriculture furnishes an excellent example of the kind of work that should be carried out; it is collecting and publishing a valuable mass of information concerning the feeding habits of birds and their nestlings, from which, in the majority of cases, they are able to deduce the precise economic value of these birds. The Central Bureau for Ornithology of the Hungarian Department of Agriculture is doing similar work. It is proposed to form a British Economic Ornithological Committee, as such work can be best carried out by a number of biologists working together. At the last annual meeting of the Association of Economic Biologists, held in April, 1908, the author moved the following resolution, which was carried unanimously :—"That this Association, recognizing the great need of an organized inquiry into the feeding habits of the birds of the British Isles, with a view to obtaining a precise knowledge of their economic status, is of the opinion that a committee should be formed with the object of carrying on investigations on this subject." The Board of Agriculture, recognizing the importance of the subject, have promised to help the inquiry.

Mr. L. Doncaster discussed "Recent Work on Determination of Sex." Until rather recent years there was the utmost diversity of opinion as to the determination of sex. Some regarded it as depending on nutrition, others on the age of the parents or maturity of the germ-cells, some as depending wholly on the egg, and others, again, on the spermatozoon. Gradually, however, a certain amount of order has emerged from this chaos. In the first place, the facts of parthenogenesis made it clear that in many cases at least the sex was determined irrevocably in the egg before segmentation; and the same thing was shown by such instances as *Dinophilus* and certain Mites, in which the eggs which will yield females are larger than those producing males, although both need fertilisation. The bee and those animals which behave similarly, on the other hand, indicate that sex may be modified by the spermatozoon, for in them virgin eggs yield males, fertilized eggs females; but here, again, no treatment after

fertilisation will turn a female into a male or the reverse. It may therefore be regarded as established in very many cases that from the moment of fertilisation at least, and sometimes in the unfertilised egg, the sex is irrevocably determined. The problem had reached this stage when M'Clung, Wilson, and others discovered that in certain insects the males and females contain different numbers of chromosomes in the germ-cells before maturation, the females having an even number and the males one less. After maturation there are two kinds of spermatozoa, one containing the same number as the mature egg, and the other having one chromosome missing. It was at first suggested that at fertilisation the spermatozoon having the larger number caused the egg to develop into a female, that with the smaller number male; but Wilson's later suggestion is that there is selective fertilisation, that the eggs are either male or female, and that male eggs are fertilised by spermatozoa having no heterochromosome, female eggs by those which have it. Morgan has recently found that in a species of *Phylloxera* there are two kinds of spermatids, one of which has one chromosome more than the other. Those with the smaller number degenerate; those with the larger develop into functional spermatozoa, and all fertilised eggs become females. Recently important evidence has been obtained from breeding experiments with Lepidoptera, fowls, &c. In the moth *Abraxas grossulariata* there is a rare variety, *lacticolor*, which is found usually only in the female. It is a Mendelian recessive, so that when paired with a typical male all the offspring are typical *grossulariata*.

"Experiments in Inheritance."—Interim Report of the Committee, consisting of Prof. W. A. Herdman (Chairman), Mr. Douglas Laurie (Secretary), Mr. R. C. Punnett, and Dr. H. W. Marrett Tims. (Drawn up by the Secretary.)

On the Inheritance of Yellow Coat Colour in Mice.—Reasons for this Research.—The primary reason for this research is the unexpected result obtained by Cuénot on cross-breeding yellow mice with mice of other colours. On mating a yellow mouse with one that was grey, black, or chocolate, Cuénot always found yellowness to act as a heterozygous Mendelian dominant to the other colour. When yellow F hybrids so produced were intercrossed they gave an F generation much in accord with expectation, being composed roughly of three yellows to one recessive. It is the gametic constitution of these extracted yellows which gives cause for surprise, and which is the essential point of importance. Eighty-one of them were tested by breeding, and it was to be expected that of these twenty-seven or so would be homozygous for yellowness, but not even one fulfilled the conditions of Mendelian purity. "Or, à mon grand étonnement," says Cuénot, "je n'en ai pas trouvé une seule; les quatre-vingt-un souris étaient toutes également hétérozygotes."

This important and interesting result has attracted explainers of different schools. Morgan makes it a text for emphasizing his views about "Contamination." Purity, in the Mendelian sense, he denies. "Purity," he says, "is dominance over latency." Cuénot, on the other hand, supported by Wilson and favoured by Lock, suggests that pure yellow-bearing germ-cells of both kinds are indeed formed

by heterozygous yellow mice, but that there is a selective fertilisation; so that a yellow-bearing ovum and a yellow-bearing sperm are either mutually repellent or mutually sterile, though capable of fertile union with germ-cells bearing other colours. Or it may be that yellow is due to the association of several factors, as appears to be the case in certain colours of sweet peas investigated by Bateson, Saunders, and Punnett, and reported on by them to the Royal Society. Castle, discussing various alternatives, commits himself to none. Further experiments are evidently most desirable.

"Index Generum et Specierum Animalium," Report of the Committee, consisting of Dr. Henry Woodward (Chairman), Dr. F. A. Bather (Secretary), Dr. P. L. Sclater, Rev. T. R. R. Stebbing, Dr. W. E. Hoyle, Hon. Walter Rothschild, and Lord Walsingham. Steady progress has been made with the indexing of the literature for the second portion of this Index (1801–1850). Among numerous works dealt with, the compiler, Mr. C. Davies Sherborn, specially mentions the following:—Boisduval's works on Lepidoptera; publications of the Bologna Academy; Bonaparte's numerous tracts and his 'Conspectus Generum Avium'; publications of the Bonn Natural History Society; publications of the Bordeaux Linnean Society; Roret's edition of the 'Suites à Buffon.' The number of index-slips increases with great rapidity, and continual effort is needed to keep this mass of material in order for reference. The slips already arranged constitute a mine of information for monographers and others. They are preserved in the Geological Department of the British Museum (Natural History), where reference is frequently made to them by members of the staff and outside workers, while information derived from them is often asked for by correspondents at a distance. The Committee would, however, be glad to see still more advantage taken of the facilities now offered for the consultation of this valuable aid to systematic work.

Prof. George H. Carpenter contributed a paper on "Some Arctic and Antarctic Collembola." The last ten years have been marked by great advances in the systematic study of the Collembola, or Springtails. Collections from many parts of the world have been worked out, but the most striking results have been obtained from the examination of specimens brought from the Arctic and Antarctic regions by various expeditions. The comparative richness of the Collembolan fauna of remote northern and southern lands is remarkable. In the Arctic, Greenland has about twenty species of Springtails, Spitzbergen sixteen, and Franz-Joseph Land seven; while in the Antarctic, Kerguelen has five, Graham Land and the South Shetlands four, South Georgia six, the Falklands ten, and South Victoria Land at least two. According to the views of most recent students, the *Poduridæ* and the *Isotominæ* are nearest to the primitive stock of the order, the *Entomobryinæ*, the *Tomocerinæ*, and the *Symphypleona* being more highly specialized. It is suggestive to find that in both the Arctic and Antarctic faunas the primitive sections are well represented, while the specialized genera have but very few species. And in the more remote and insular regions the higher groups seem entirely absent. Of much interest is the presence of two Arctic

Isotomines in our own islands. These are *Agrenia bidenticulata* (Tullb.), a species both Arctic and Alpine, discovered last year in Irish and North British mountain streams, and *Proisotoma Beselsii* (Packard), which inhabits the Arctic Regions of both the Old and New Worlds and the coast of Scotland. "Bi-polarity" in the Collembola is shown by Wahlgren's recent record of this latter species from Terra del Fuego and by the presence of a closely allied form (*Proisotoma Brucei*, Carp.) on the South Orkneys. Such distribution indicates a high antiquity (probably Mesozoic) for the species. A similar conclusion is suggested by a comparison of the distinctively Antarctic Springtails. Several genera are apparently confined to the southern regions. Among these *Cryptopygus* (Willem) is represented by identical or nearly allied species in Terra del Fuego, Graham Land, South Shetland, South Orkneys, and South Georgia. Turning to genera of wider range we find the same *Isotoma* (*I. octo-oculata*, Willem) present in Graham Land, South Shetland, South Orkneys, and Kerguelen, while the *Isotoma* of South Victoria Land (*I. klovstadi*, Carp.) is closely allied to a Fuegian species. Such distributional facts suggest a considerable geological age for the species and a former wide extension of the Antarctic Continent. The National Antarctic 'Discovery' Expedition collected from moss at Granite Harbour, South Victoria Land, a remarkable Springtail, referable to the *Poduridæ*, but showing some striking affinities to the *Isotominæ*. This insect—apparently the most southerly terrestrial animal yet known—will be described and figured in the forthcoming part of the Expedition Reports.

"The Migratory Movements of certain Shore-Birds as observed on the Dublin Coast" were described by Mr. C. J. Patten. "While the majority of my observations, extending over twenty years, on the migratory movements of shore-birds along the Dublin coast have been incorporated in my work entitled 'The Aquatic Birds of Great Britain and Ireland,' published at the end of the year 1906, I still continue to visit my former hunting-grounds, and, with the aid of trustworthy correspondents, have collected further information on the subject. To add to my personal observations and to enable me to bring before the meeting of the British Association information as recent as possible, I selected the Dublin coast this autumn as a sea-side resort. I would refer particularly to the Sanderling (*Calidris arenaria*). There is now strong evidence to show that this bird is found in adult plumage throughout the breeding-season on that coast. The observations of Mr. A. Williams, made in July, 1906, in this locality, on the Sanderling are of interest, as there was an unusually large gathering of adult birds recorded. In many ways the Turnstone repeats the migratory movements of the Sanderling, and is found throughout the year on the Dublin coast in adult plumage. I have, moreover, dissected the genitals of the female bird, shot at the height of the breeding-season, and have found quite ripe ova. The time will, I believe, yet come when this species will be discovered breeding on the Irish sea-board, or perhaps along the shores of inland lakes."

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COMMON TERN WITH CHICK AND EGG.